

WHAT IS CLAIMED IS:

1. In a fusing station for fusing a toner image to a receiver member, said fusing station including a heated fuser roller operatively associated with a pressure roller, said fuser roller comprising:

5 a rigid, cylindrical, thermally conductive, metal core member;
a multilayer deformable annular structure around said core member, said deformable annular structure including an elastomeric base cushion layer innermost around said core member, a high thermal conductivity layer around said base cushion layer, and a thin flexible toner release layer around said high thermal conductivity layer;
10 wherein thermal conductivity of said base cushion layer is lower than thermal conductivity of said high thermal conductivity layer; and
wherein the value of thermal conductivity of said high thermal conductivity layer is equal to or greater than 1 BTU/hr/ft/°F.
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2. The fuser roller of Claim 1, wherein:
said thermal conductivity of said base cushion layer is in a range of approximately between 0.1 BTU/hr/ft/°F to 0.2 BTU/hr/ft/°F; and
20 said thickness of said base cushion layer is in a range of approximately between 0.180 inches to 0.250 inches.

3. The fuser roller of Claim 2, wherein:
said thermal conductivity of said base cushion layer is in a range of approximately between 0.15 BTU/hr/ft/°F to 0.17 BTU/hr/ft/°F; and
25 said thickness of said base cushion layer is in a range of approximately between 0.190 inches to 0.195 inches.

4. The fuser roller of Claim 1, wherein said base cushion layer is an elastomeric material comprising less than 30% by weight of a particulate filler including a structural filler, said particulate filler including particles having sizes in a range of approximately between 0.1 μm to 20 μm , said particles 5 including at least one particulate filler selected from the group consisting of: mineral silica particles, fumed silica particles, and iron oxide particles.

5. The fuser roller of Claim 1, wherein:
said high thermal conductivity layer includes a metal with thermal 10 conductivity equal to or greater than 5 BTU/hr/ft/ $^{\circ}\text{F}$ and thickness in a range of approximately between 0.002 inches to 0.005 inches.

6. The fuser roller of Claim 5, wherein:
said metal is selected from the group consisting of: copper, brass, 15 aluminum, and nickel.

7. The fuser roller of Claim 1, wherein said thickness of said toner release layer is equal to or less than .0005 inches.

20 8. The fuser roller of Claim 1, wherein said toner release layer includes a fluoropolymer.

9. The fuser roller of Claim 8, wherein said fluoropolymer includes a random copolymer of vinylidene fluoride, tetrafluoroethylene, and 25 hexafluoropropylene, said random copolymer having subunits of:
-(CH₂CF₂)_x-, -(CF₂CF(CF₃))_y—, and -(CF₂CF₂)_z-,
wherein:
x is from 1 to 50 or 60 to 80 mole percent of vinylidene fluoride,
y is from 10 to 90 mole percent of hexafluoropropylene,
30 z is from 10 to 90 mole percent of tetrafluoroethylene, and
x + y + z equals 100 mole percent.

10. The fuser roller of Claim 1, wherein said toner release layer includes a particulate filler.

11. The fuser roller of Claim 10, wherein in said toner release 5 layer, said particulate filler has a particle size in a range of approximately between 0.1 μm to 10 μm ; and

 said particulate filler has a total concentration in said toner release layer of less than about 20% by weight.

10 12. The fuser roller of Claim 11, wherein said particulate filler has a particle size in a range of approximately between 0.1 μm to 2.0 μm .

13. The fuser roller of Claim 10, wherein:
 said particulate filler in said toner release layer includes zinc oxide 15 particles and fluoroethylenepropylene resin particles, said zinc oxide particles having a concentration in a range of approximately between 5% to 7% by weight, and said fluoroethylenepropylene resin particles having a concentration in a range of approximately between 7% to 9% by weight.

20 14. The fuser roller of Claim 1, wherein said fuser roller further comprises a removable replaceable annular sleeve member, said sleeve member including at least one of the layers included in said deformable annular structure.

25 15. The fuser roller of Claim 1, wherein:
 said base cushion layer includes an addition-crosslinked polydimethylsiloxane;
 said high thermal conductivity layer includes a metal with thermal conductivity equal to or greater than 5 BTU/hr/ft/ $^{\circ}\text{F}$ and thickness in a range of approximately between 0.002 inches to 0.005 inches; and
30 said toner release layer includes a fluorocarbon thermoplastic random copolymer of vinylidene fluoride, tetrafluoroethylene and hexafluoropropylene.

16. The fuser roller of Claim 1, wherein said flexible release layer includes a chemically unreactive, low surface energy, flexible, polymeric material suitable for high temperature use.

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17. In an electrostatographic reproduction apparatus for forming a toner image on a receiver member, a fusing station for fusing said toner image to said receiver member, said fusing station comprising:

10 a pressure roller;
a fuser roller operatively associated with a pressure roller, said fuser roller being elastically deformable and engaged under pressure with said pressure roller so as to form a fusing nip therebetween, said pressure roller being relatively harder than said fuser roller, said toner image on said receiver member being moved through said fusing nip for said fusing;

15 wherein said fuser roller includes a rigid, cylindrical, thermally conductive core member; a multilayer deformable annular structure around said core member, said deformable annular structure including an elastomeric base cushion layer innermost around said core member, an high thermal conductivity layer around said base cushion layer, and a thin flexible toner release layer around 20 said high thermal conductivity layer;

wherein thermal conductivity of said base cushion layer is lower than thermal conductivity of said high thermal conductivity layer; and

wherein the value of thermal conductivity of said high thermal conductivity layer is equal to or greater than 1 BTU/hr/ft/°F.

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18. The fusing station of Claim 17, wherein further:

 said thermal conductivity of said base cushion layer is in a range of approximately between 0.1 BTU/hr/ft/°F to 0.2 BTU/hr/ft/°F;

5 said thickness of said base cushion layer is in a range of approximately between 0.180 inches to 0.250 inches;

 said high thermal conductivity layer comprises a metal with thermal conductivity equal to or greater than 5 BTU/hr/ft/°F and thickness in a range of approximately between 0.002 inches to 0.005 inches; and

10 said thickness of said toner release layer is equal to or less than .0005 inches.